REMARKS

The Office Action mailed May 7, 2007, has been carefully reviewed and Applicant notes with appreciation the identification of allowable subject matter.

By this Amendment, Applicant has amended claims 13 and 19. Claims 13-24 remain pending in the application. Claims 13 and 19 are independent.

The Examiner rejected claims 13-24 under 35 U.S.C. 112, second paragraph, as being indefinite but stated that claims 13-24 would be allowable if rewritten or amended to overcome the rejection under 35 U.S.C. 112, second paragraph.

By this Amendment, claims 13 and 19 have been amended to more particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically, the term "bistatic pair" has been defined in claims 13 and 19 as constituting a receiver and a transmitter that are placed at different points, with each such bistatic pair being defined in the claims as a measuring facility. This meaning of "biostatic" as referring to a transmitter and a receiver at two separated sites is well known in the art, as evidenced by enclosed pages 36-1 and 36-2 of Skolnik's Radar Handbook (McGraw-Hill, Inc., 1970). Accordingly, with this clarification, favorable

reconsideration and allowance of claims 13 and 19, as well as claims 14-18 and 20-24 properly dependent thereon, is requested in accordance with the Examiner's indication of allowable subject matter.

With this amendment and the foregoing remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any questions or comments, the Examiner is cordially invited to telephone the undersigned attorney so that the present application can receive an early Notice of Allowance.

Respectfully submitted,

JACOBSON HOLMAN PLLC
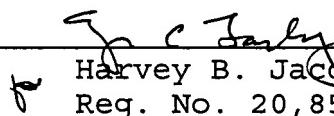
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RADAR HANDBOOK

Chapter **36**

Bistatic and Multistatic Radar

JAMES W. CASPERS

Naval Electronics Laboratory Center

36.1 INTRODUCTION

Early experimental radar systems in the United States and the United Kingdom were predominantly of the bistatic type, the transmitter and receiver usually being separated by a distance comparable to the target distance.[1,2] With the invention of the duplexer at U.S. Naval Research Laboratory in 1936, providing a means of using a common antenna for both transmitting and receiving, monostatic (single-site) radar became practical, and bistatic radar became dormant. It was not until the early 1950s that interest revived.[1]

Bistatic radar employs two separated sites. Figure 1a shows its usual form. A transmitter is placed at one site and the associated receiving equipment is placed at another; the receiving site is separated from the transmitting site. Detection is based upon target reflections received at the receiving site. The total propagation time and the elevation and azimuth angles measured at the receiver site provide target-location information. In addition to the usual forms of pulse radar waveforms, various continuous modes of transmission are readily used because the separation of transmitting and receiving sites provides isolation.

36-2

BISTATIC AND MULTISTATIC RADAR

It is also possible to employ a transmitter and receiver at both sites. Each site may receive target reflections of radiation from its own transmitter and from the other transmitter.

Passive bistatic receiving systems utilize two receiving sites. They detect only the targets that radiate electromagnetic energy. Detection is usually based upon reception of the radiated energy at both sites. Target-location information is derived from signal arrival-time differences and angular measurements made at one or both sites. Passive systems have application where the operation of a radar transmitter is undesirable. Because of similarities to bistatic and multistatic radars, passive systems will be included in this chapter.
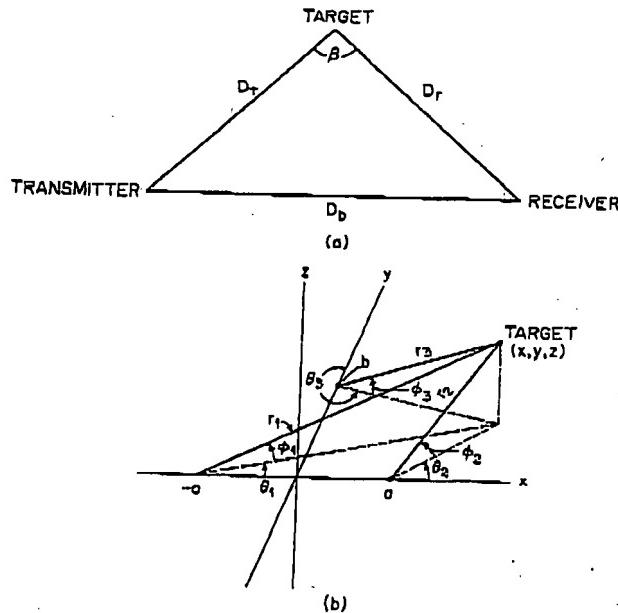

Fig. 1 Bistatic and tristatic geometry: (a) plane defined by the transmitter, target, and receiver; (b) coordinate system (site at b is deleted for bistatic purposes).

When separate transmitting and receiving antennas are at a single site, as is common in many CW radars, the term *bistatic* is not used to describe such a system since the radar has the characteristics of a monostatic radar.

Multistatic radar employs more than two separated sites. Some multistatic configurations can be treated as combinations of several bistatic radars or of several monostatic radars, or as combinations of bistatic with multistatic radars. Emphasis will be placed on, but not limited to, multistatic systems that provide features not obtainable in bistatic or monostatic radar. These features are discussed in Sec. 36.4. For all multistatic radars the available location techniques are more powerful than those for bistatic radar.

One form of multistatic radar might use one transmitter site with two or more receiving sites. It is capable of locating targets by means of echo arrival-time data without the use of angular information.

Multistatic radar might also employ a transmitter at each site. An example is the combination of three range-only monostatic radars, sometimes called a trilateration radar.